Idaho
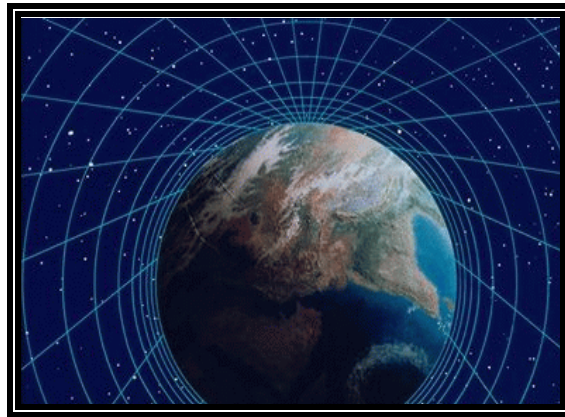# Technology Education
Technology 2001 Taskforce Report

Idaho Division of Professional-Technical Education
650 West State Street
Boise, Idaho 83720-0095

Mike Rush
Administrator

Clifford Leon Green
Program Manager

2001

Idaho
Professional
Technical
Education

Table of Contents

Page

List of Tables and Figures

Acknowledgments

The adoption of the *Idaho Standards for Technology Education* would not have been possible without the efforts of many people. The following members of the writing/development team, Technology2001 Taskforce participants and Idaho Technology Educators gave generously of their time and expertise in developing this document.

Writing/Development Team
Jared Merrick –
University of Idaho
Don Eshelby –
Division of PTE
Cliff Green –
Division of PTE

Administrators
Sam Nielsen – Payette
Glenn Orthel – Kuna
Chuck Kinsey – Lakeland

Technology 2001 Participants
Terry Gibbons
Phil Willey
Dave Heath
Miles Carroll
Bill White
Jerry Richardson
Leonard Eby
Linda Marley
Jim Baxter

Business Partners
Neils Haslam – Idaho Instrument
Doug Thompson – Technology Training Systems

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Message to Technology Education Teachers

July, 2001

Greetings from the Idaho State Division of Professional-Technical Education:

In early 2000 a taskforce of prominent Idaho technology educators was convened and charged with developing standards for Technology Education programs in Idaho. The result of their effort is contained within this document, *The Idaho Technology Education, Technology 2001 Taskforce Report*.

In addition to the adopted standards, pertinent information on topics such as curriculum recommendations, funding, facilities, certification, and approved courses are also included in this document.

If you are a pre-service teacher, this document should provide an overview of the who, what, where, when and why of Technology Education programs. If you are a seasoned veteran, it may serve well as a reference manual for program operations and curriculum development. Either way we hope you find the information contained in these pages useful.

If you have any questions about Technology Education programs or the information provided in this document feel free to call the Division of Professional-Technical Education, 208-334-3216 or email me at cgreen@pte.state.id.us.

Sincerely,

Dr. Clifford L. Green
State Division of Professional-Technical Education
Program Manager, Technology Education

Contacts

State Board of Professional-Technical Education

Paul Agidius	**Curtis Eaton**
Blake Hall	**James Hammond**
Marilyn Howard	**Rodrick Lewis**
Darrell Hammond`	**Karen McGee**

Office of the State Board of Education
Greg Fitch, Executive Director
208-334-2270

State Division of Professional-Technical Education
Mike Rush, Division Administrator
Cliff Green, Program Manager
208-334-3216

Postsecondary Technology Education Programs
University of Idaho
James "Jim" Cassetto
Department Coordinator/Assistant Professor,
208-885-6492

Technology Education Association of Idaho (TEAI)
Past President – Jim Siggaard
President – Miles Carroll
President Elect – David Heath
Vice President – Doug Walrath
Sec./Treasurer – Brent Terry
Public Relations Officer – Sue McClintock
Region 1 – Leonard Eby
Region 2 – Jerry Richardson or Jared Merrick
Region 3 – Brent Terry or Jeff Grove
Region 4 – Jim Siggaard
Region 5 – Phil Willey or Tani Hayes
Region 6 – Dave Heath or Miles Carroll

International Technology Education Association
Executive Director – Kendall Starkweather, Ph.D., 703-860-2100

Tech Prep Coordinators
State Coordinator – DebAnn Rippy, 208-334-3216
Region 1 – Pete Martinez, 208-687-5775
Region 2 – Todd Broadman, 208-792-2418
Region 3 – Nancy Ness, 208-426-4029
Region 4 – Bob Becker, 208-733-9554
Region 5 – Fred Ball, 282-4663
Region 6 – Carol Lowe, 524-3000 x3362

Technology Student Association
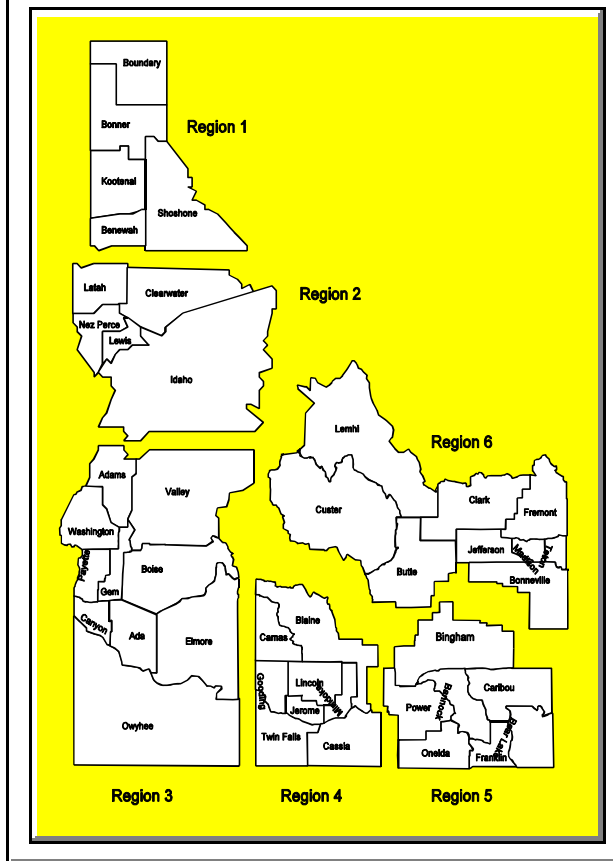National Executive Director – Rosanne White, 703-860-9000
State Leadership Coordinator – Ron Stone, Centennial High School, 208-939-1404 x435

Technology Educators Listserv
To join email a request to cgreen@pte.state.id.us

Figure 1. (Regions)

Last Updated 07/03/01

Overview of Technology Education

Let's start with an explanation of technology. Scientists view technology as the application of science and mathematics for a specific purpose. Historians, engineers and technologists believe technology to be the application of knowledge, tools, and skills to solve practical problems and extend human capabilities. The philosophy of Technology Education programs in Idaho's public schools is firmly grounded in this premises and delivered through a sequential offering of courses in the four major technology systems: Construction; Manufacturing; Power, Energy and Transportation and Communication. The four basic courses are in turn supported by two additional subject fields, Principles of Technology and Emerging Technologies.

Communications Systems - the exchange of information
Manufacturing Systems - the production of goods
Construction Systems - the fabrication of structures
Power/Energy/Transportation Systems - the movement of objects or forces
Principles of Technology - the study of the basic principles of physics
Emerging Technologies - the study of new and evolving technologies

Technology Education curriculum covers the evolution of technology and its subsequent effects on people, the environment, and society, providing students an opportunity to gain understanding, use, and control of technology. Students learn how to adapt to change, deal with forces that influence their future, and participate in controlling their future. Manipulative activities with tools, machines, materials, and processes help students hone their creativity, decision-making, teaming, critical thinking, and problem solving skills.

Elementary Technology Education
Technology Education at the Elementary level is not mandatory but highly recommended. The Division of Professional-Technical Education seeks to promote integration of Technology Education content into existing elementary math, science and language arts curriculum.

Middle School Technology Education
Technology Education at the middle school is exploratory in nature and content, focusing on problem solving, career orientation, and learning for tomorrow's changing society. The middle school can be the most influential stage in a student's technological experience. It is at this level that future educational pursuits are being formulated. Moreover, the middle school program serves as a feeder program for advanced level courses and is the basis for developing a healthy appreciation for technology.

While studying Technology Education at the Junior High/Middle School level, students develop an appreciation of the scope of contemporary technology; study and analyze the materials, products, processes, problems, uses, developments, and contributions of technology; identify the occupational areas and educational programs in technological career fields; research plan, design, construct and evaluate problems and projects common to the technological career fields; experience the organization and management systems of business and industry, and learn safe use of basic tools, machines, materials, and processes associated with technology.

Secondary Technology Education
Technology Education at the high school level (grades 9-12) provides an in-depth foundation for career preparation and offers students the opportunity to make informed choices about potential occupations. Students can choose to pursue a variety of interests or may decide to concentrate on a career path. Regardless of career goals, as students become more adept with consumer awareness, problem solving and occupational readiness. Technology Education classes help students explore the job market and make sound decisions about additional education or possible careers. Whether the additional education is at a professional-technical school, college, university, or in industry, Technology Education classes will help prepare students to make sound, logical choices.

The curriculum offers sequential courses that build on previously learned content without repetition. Technology Education students gain competence in each of the four systems through the practical application of:

- basic scientific and mathematical principles researching and solving problems involving the materials, processes, products, and services of industry and technology
- in-depth understanding and appreciation of technology in our society and culture
- developing core skills in processes, materials, tools, and machines
- making decisions regarding postsecondary technology careers, engineering programs, service-related fields, or advanced Professional-Technical programs
- experiencing the organization and management systems of business and industry

Technology Education takes learning with technology one step farther than traditional disciplines. Technology becomes a school subject, with the ultimate goal of technological literacy for everyone. The versatility of Technology Education can also be found in its integration and application into traditional content areas such as reading, math, science, language arts providing relevance as well as rigor to a student's educational experience.

The *Standards for Technology Education* and *The Idaho Achievement Standards* should be integrated throughout the elementary and secondary education learning experience. Teaching technology provides

tremendous opportunity for students to apply an integrated content through acquisition of knowledge, design and use of materials and processes to systematically solve real world problems. Critical thinking, teamwork, research and development, experimentation, and testing help deliver the goals of the Technology Education curriculum and enrich the entire learning and teaching process. Ultimately, the result is educators provide students with opportunities to develop their own perspectives of technology and its interrelationships with the world in which we live as well as develop ethics, personal integrity and employment skills.

The State of Technology Education in Idaho

In a recent article in the Idaho Statesman, Boise earned a ranking of 12th in the nation over all for high technology growth rate. Similar to Boise, from Northern to Southern Idaho our state boasts a plethora of technology based companies. In construction, Morrison-Knudsen (Washington Group); in power and energy, INEEL; in plastic injection manufacturing D-8; in metal manufacturing, Uhling/Miltec and Simplot; in high tech and manufacturing, Hewlett-Packard and Micron Technologies as well as many others. Business and industry as well as government and higher education understand the value of individuals who are technologically knowledgeable and savvy. For this reason, teaching Technology Education is of great importance. Ultimately, elementary, middle, and high school teachers play a critical role in the development of technologically literate citizens.
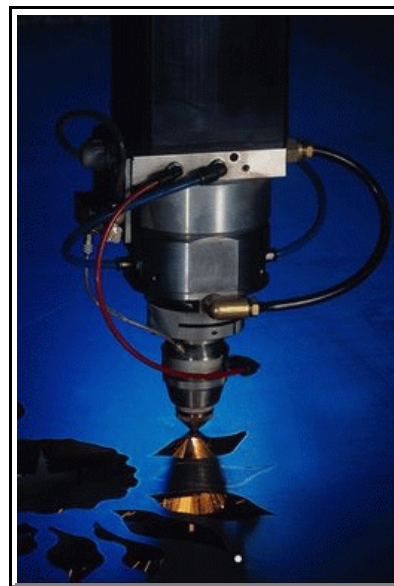
However, even with the large role that various technologies play in Idaho, technology, in and of itself, should not be viewed as a panacea for education or society's woes. The focus of Technology Education should be on appropriate application. If our children develop and use technology in the context of the community's and nation's goals and values, they will continue to experience even more ways to work, enjoy leisure, communicate, and organize their lives.

Demographics

As seen in Table 1, a large portion of Idaho Technology Education programs are located in junior high and high schools with a student population of 800 or more. The remaining programs are located in high schools with a student population of less than 799.

Table 1. (Secondary Schools with PTE Technology Education Programs)

Secondary Schools with Technology Education Programs		
School Population	Number of High School Programs	Number of Junior High Programs*
800 and over	48	17
350-799	17	3
150-349	13	2
0-149	8	0

*Middle School programs are not eligible for added cost reimbursement.

Because Technology Education programs can be found in elementary, middle school, junior high and high schools integration within and across schools with core subjects is encouraged.

Figure 2. (Technology Education 9-12 Enrollment in Funded Programs by Year)
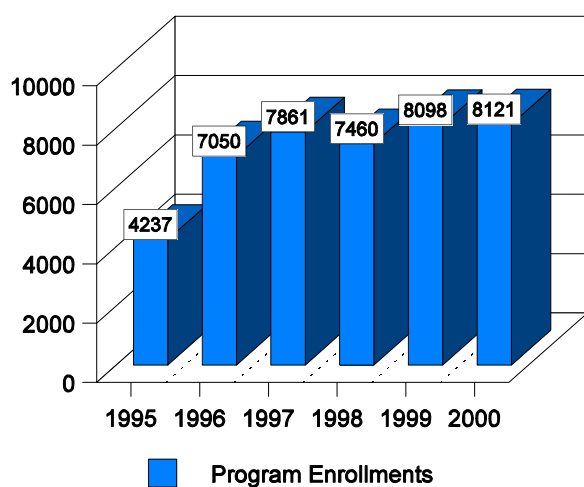
During the 2000 school year, there were approximately 8,121 students enrolled in and served by the 55 districts offering Technology Education programs. As seen in Figure 2, enrollment in Technology Education programs has almost doubled in the last five years with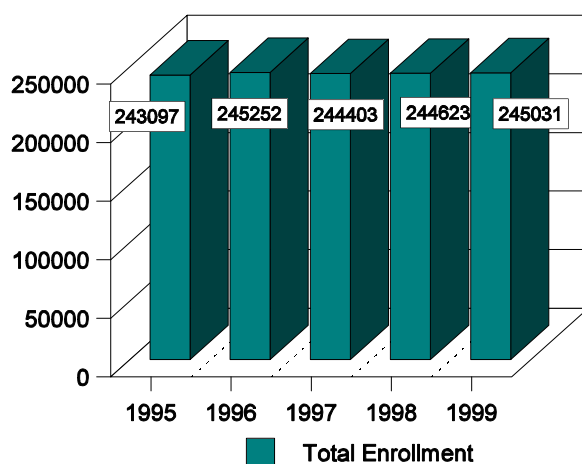 the majority of growth taking place between 1995 and 1996. The cause of the large increase is believed to be a result of the implementation of the formula funding "added cost" reimbursement system.

Figure 3. (Idaho K-12 Enrollments)

As compared with total enrollment of students between 1995 and 1999, Technology Education programs had a net growth of 3,861 students while the state of Idaho in its entirety had a net growth in enrollment of 1,934 students during the same time period.

Last Updated 07/03/01

Table 2. (Technology Education Special Populations 2000)

Special Populations 2000		
Disabled	503	6%
LEP	185	2%
Economically Disadvantaged	1,476	18%
Single Parents	40	0.5%

Traditionally, enrollment in Technology Education programs been exclusively male. Between 1998 and 2000 the percentage of females rose only four percent from thirteen percent to seventeen percent. In comparison, 45% of all students enrolled in Professional-Technical education programs were female. When compared with all Professional-Technical programs progress still needs to be made to achieve equity.

As seen in Table 2, the 2000 data on special populations reveals that 6% of Technology Education students were disabled; 2% were LEP; 18% were economically disadvantaged and .05% were single parents.

Image and Communication

Image and Communication

Successful Technology Education programs involve support systems that stimulate innovation and risk taking at local and state levels. Advocates at all educational levels are needed to provide guidance and support to teachers implementing programs. Advocacy can be developed by:

*   Establishing a program advisory committee
*   Networking and sharing resources and ideas with other teachers. Try an open house for faculty
*   Establishing business and industry support
*   Gathering and publicizing data about Technology Education successes
*   Informing all educators and the community about the contributions of Technology Education to the total education of the student. Be sure to emphasize the overriding importance of good teaching
*   Promoting the positive image of Technology Education, by bringing programs in compliance with minimum standards
*   Encouraging communication among the State Division of Professional-Technical Education, local school administration and Technology Education instructors on policy changes and reporting procedures
*   Effectively communicating via the local media, state Professional-Technical Education publications, to portray a positive image of what is happening in Technology Education programs
*   Host student orientations or field trips from feeder schools
*   Be honest about any problems
*   Be prepared to explain how Technology Education is funded at your school
*   Be prepared to explain how results are being measured
*   Extend and invitation to parents

Parent Involvement
There are many ways in which parents can assist the instructor, principal, and administrator in the challenge of operating a Technology Education program, several of which are listed below. Parents are the closest community source and are the most interested segment of the community. They are partners in education and represent the industrial sector because they comprise the workforce in the community. They need to be involved in all aspects of program operation from Advisory Committee members to classroom volunteers and substitute instructors. Their businesses become extended classrooms, they provide fiscal and physical resources, and they can serve as the sounding board for the school for bond issues and other community involvement. Parents are essential to school-to-work and site-based education initiatives.

Parents can help in any of the following ways:
Assist the school board and administration in offering a strong Technology Education program that is essential for all students; work with teachers in broadening the relationships between the school and industry in the region and local community; offer their services as volunteers or guest presenters, based upon their various occupational backgrounds and write or call local legislators to recommend adequate support for technology programs as well as for local funding issues.

Future Directions

The 21st century will bring new technologies that will be more complex, mature, and versatile than those we utilize today. The realities of today's technological advancements will undoubtedly reshape how we work, how we create, how we view the world, how we learn, and most importantly, what we must learn. We are now in a position to exercise options that were beyond our comprehension a mere decade ago. How we educate a generation that can comprehend, cope with, and direct these technologies is a challenge to which schools must respond.
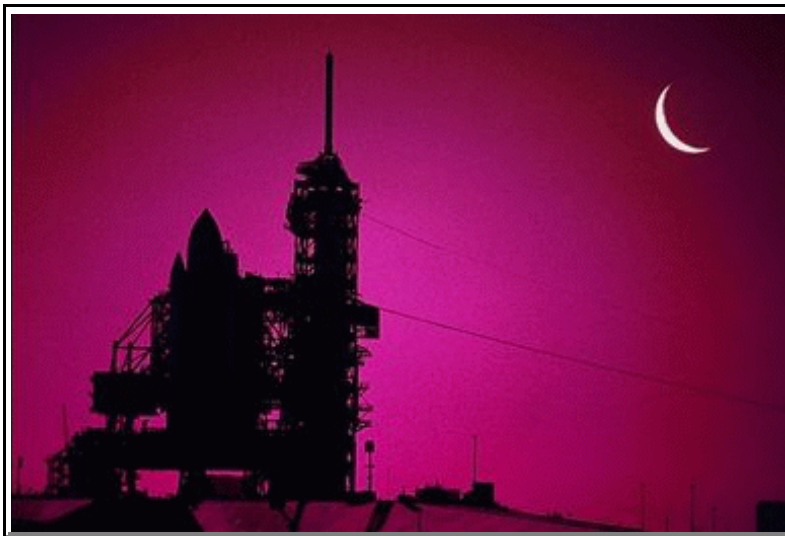
Business and Industry seek employees who can calculate, solve problems, communicate effectively, and most importantly, people who have organized thought processes and a good work ethic. These are the skills that are emphasized in Technology Education programs. Technology Education also provides students with an understanding and appreciation for the technological concepts, principles and systems which are the basis of all occupations. In this spirit the Division has created and implemented a workforce education option as part of the curriculum offerings which provides students the opportunity to learn in the workplace. Students taught by industry mentors alongside of other employees as an active participant in both the educational community and business and industry sectors.

Because the only future certainty is uncertainty, it is incumbent that Idaho's technology education teachers provide opportunities for students to understand, use and control current technology with an eye towards those on the cutting edge. Only then will our students be prepared to succeed in the new world.

Technology Education Vision, Mission, and Philosophy

Vision
Technology Education in the 21st century, will be a vital part of every student's education. It is our vision that every student will be afforded the opportunity to become technologically literate.

Mission
The mission of Technology Education in Idaho is to develop student technological literacy and to provide an opportunity for those students to learn about technology process and the knowledge needed to solve problems and extend human capabilities.

Philosophy
Technology Education is a dynamic performance-based discipline providing students the opportunities to develop leadership, self-confidence, technical and academic knowledge. Using current technologies and processes, outcomes are achieved through interdisciplinary, action-based activities involving teamwork, problem solving, economic and environmental issues related to the future.

Standards for Technology Education

What are standards?   Standards specify what students should know and be able to do. They provide specific evidence of the level of learning desired and serve as targets for the teaching of goals and objectives. Idaho's standards for Technology Education include both content and performance components.

- Content refers to *what* students should know and be able to do.
- Performance tells *how* students will show or give evidence that they have met a standard.

Why are standards necessary? Standards serve as a directional compass for both teaching and learning. By setting standards, students, parents, educators, government officials, and citizens know what students should have learned and what teachers should have taught at a given point in time. Without precise standards, both students and teachers may drift off course in their learning and instructional efforts. Clear statements about what students must know and be able to do are essential to ensure that our instructional programs provide students with the knowledge and skills necessary for success.
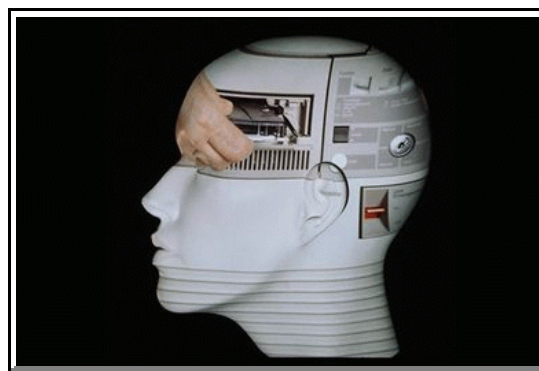
Why are state-level standards important? Public education has historically been a state responsibility. The state administrator and the legislature are responsible for ensuring that all students have equal access to high-quality education programs. At minimum, this responsibility requires clear statements of what all students in the state should know and be able to do as well as evidence that students are meeting these expectations. In addition, standards form a basis on which to establish the content of a statewide assessment system.

Why does Idaho need its own standards? While educational needs may be similar among states, state values may differ. Idaho standards should reflect the collective values of the citizens of Idaho and be tailored to prepare students for economic opportunities that exist in Idaho, the nation, and the world.

Must a school or a school system adopt *Idaho's Standards for Technology Education*? Adopting the standards is voluntary, not mandatory. However, Idaho law requires that all public school systems adopt and implement the *Achievement Standards*. The Idaho Technology Standards were developed with the achievement competencies in mind and are designed to help meet or in some cases exceed these competencies. Therefore, it would behoove local educators to review and employ the standards as they work toward creating a quality instructional program.

How will local school systems use the standards? School systems may use the standards as guides for developing local grade-by-grade curriculum. Implementing standards may require some school systems to upgrade school and system curricula. In some cases, this may result in significant changes in instructional methods and materials, local assessment strategies, and professional development opportunities for teaching and administrative staff.

What are the next steps beyond the standards? There are several needs and options after the standards are implemented. It is understood that the standards by themselves will not sufficiently address or correct deficiencies in a Technology Education curriculum. As a follow-up to the standards, sample instructional and teaching activities are included with this report on CD-Rom. Additional content is being developed to provide practical examples of how the standards can be met and employed. In addition, program evaluation strategies based on the standards will need to be designed, field tested, and implemented as a means of assessing and certifying the quality of instruction programs.

How were the standards developed for Idaho? The standards in this document represent the result of a three-phase educational research procedure. Phase-one focused on a comprehensive review of the literature pertaining to Technology Education curriculum designs, state curriculum goals, as well ongoing standards projects from other states and the national standards project. The result of this phase established a starting point for the Idaho standards.

Phase-two brought together educators and business & industry representatives from across the state to provide specific input on the educational benchmarks needed for Technology Education. Exemplary teachers representing middle, and high schools as well as teacher educators from collegiate programs provided valuable information that yielded criteria for developing the Idaho standards for Technology Education. In addition, business and industry representatives helped to guide the standards development by offering important and valuable suggestions that helped to clarify the real-world needs for students as they prepare for their adult lives. This input was collected during focus group meetings.
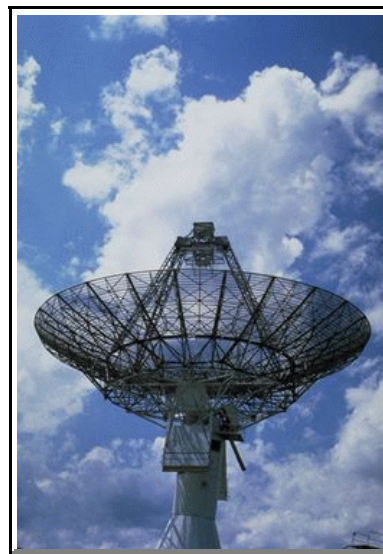
Phase-three used the results from the focus group meetings to ascertain the perspectives of the entire Technology Education teacher population in Idaho. Teachers were able to provide input on the proposed standards criteria with the collective results providing a prioritized list of standards for Technology Education.

Idaho Standards
The format for the Idaho Technology Education Content Standards was adopted from the International Technology Education Association's *Standards for Technological Literacy*. The individual standards in this report are provided in five major categories:

- Nature of Technology
- Technology and Society
- Design
- Abilities for a Technological World
- The Designed World

Each of the five major categories is further broken down into standards and further into benchmarks at predefined grade level strata for each standard. Standards specify what Technology Education students should know and be able to do in order to be technologically literate; while benchmarks provide fundamental content elements for each of the 20 standards.

Last Updated 07/03/01

Content Standard–Nature of Technology

Performance Objective:
Students will develop an understanding of The Nature of Technology.

Rationale:
In today's world, technology is a complex social enterprise that includes a variety of different applications. The word "technology" typically conjures up a myriad of different ideas and it is because of this it is often misunderstood. When asked to define technology, one might respond that technology is computers or the Internet, however, technology is much more. Simply put, technology is how humans apply resources such as information, knowledge, energy, tools, system, space, time, and capital to solve practical problems, modify the world, and extend their capabilities (Chamuris, C. & Wallace M., 1996).

Table 3. (Standards, Nature of Technology)

Standards and Benchmarks for Nature of Technology				
Standards	**Benchmarks K-2**	**Benchmarks 3-5**	**Benchmarks 6-8**	**Benchmarks 9-12**
The Characteristics and Scope of Technology	- Natural World and human-made world - People and Technology	- Things found in the human-made world - Tools, materials, and skills - Creative thinking	- Usefulness of technology - Development of technology - Human creativity and motivation - Product demand	- Nature of technology - Rate of technological diffusion - Goal directed research - Commercialization of technology
The Core Concepts of Technology	- Systems - Resources - Processes	- Systems - Resources - Requirements - Processes	- Systems - Resources - Requirements - Trade offs - Processes - Controls	- Systems - Resources - Requirements - Optimization of trade offs - Processes - Controls
Relationships Among Technologies and the Connections Between Technology and Other Fields	- Connections between technology and other subjects	- Technologies integrated - Relationships between technologies and other fields of study	- Interaction of systems - Interaction of technological environments - Knowledge from other fields of study and technology	- Technology transfer - Innovation and invention - Knowledge protection and patents - Technological knowledge and advances of science and mathematics and vice-versa

Content Standard – Technology and Society

Performance Objective:
Students will develop an understanding of Technology and Society.

Rationale: People develop and use technology to enhance their quality of life. Technologies such as those found in the automobile, microprocessor, nuclear power, genetic engineering, and factory automation have enhanced our mobility, enabled us to harness new energy resources, increased food production, reduced disease, and freed people from tedious or dangerous tasks. While each of these technologies has very distinct advantages, they also have clear disadvantages that need to be weighed carefully by those who live in a technological society. Given the rapid growth in technological capability, it is important that every citizen take an active role in promoting the common good by making informed decisions about risks and benefits of technology. To be active citizens, students need to understand the positive and negative impacts of technology on society and the environment. They need to weigh carefully the benefits and risks of technologies, and make informed decisions about technological issues.
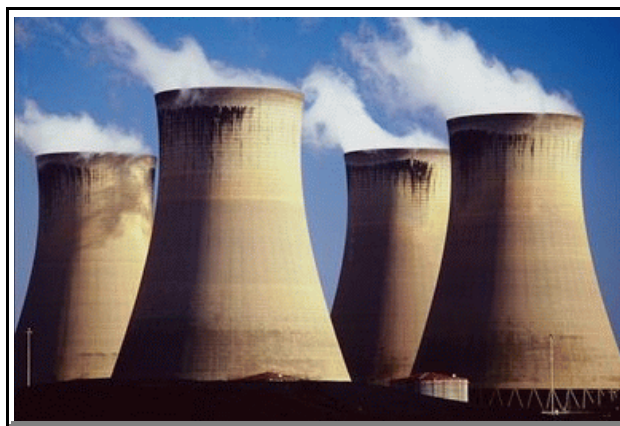
Table 4. (Standards, Technology and Society)

Standards and Benchmarks for Technology and Society				
Standards	**Benchmarks K-2**	**Benchmarks 3-5**	**Benchmarks 6-8**	**Benchmarks 9-12**
The Cultural, Social, Economic, and Political Effects of Technology	- Helpful or harmful	- Good and bad effects - Unintended consequences	- Attitude toward development and use - Impact and consequences - Ethical issues - Influences on economy, politics and culture	- Rapid or gradual changes - Trade offs and effects - Ethical implications - Cultural, social, economic and political changes

The Effects of Technology on the Environment	- Reuse and/or recycling of material	- Recycling and disposal of waste - Affects environment in good and bad ways	- Management of waste - Technologies repair damage - Environments vs. economic concern	- Conservation - Reduce resource use - Monitor environment - Alignment of natural and technological processes - reduce negative consequences of technology - Decisions and trade-offs
The Role of Society in the Development and Use of Technology	- Needs and wants of individuals	- Changing needs and wants - Expansion or limitation of development	- Development driven by demands - Inventions and innovations - Social and cultural priorities - Acceptance and use of products and systems	- Different cultures and technologies - Development decisions - Factors affecting designs and demands of technologies
The Influences of Technology on History	- Ways people have lived and worked	- Tools for food, clothing, and protection	- Process of inventions and innovations - Specialization of labor - Evolution of techniques, measurement, and resources - Technological and scientific knowledge	- Evolutionary development of technology - Dramatic changes in society - History of technology - Early technological history - The Iron Ages - The Middle Ages - The Renaissance - The Industrial Revolution - The Information Age

Content Standard – Design

Performance Objective:
Students will develop an understanding of Design

Rationale: Technological systems have always been a part of daily life. Recently, they have become more apparent because of their sophistication and influence. By coordinating and processing resources, these systems help to provide products and services such as food, clothing, shelter, entertainment, health care, security, and other necessities and comforts of life. Though often subtle, these systems are everywhere in our world and, without exception, they impact all of us.
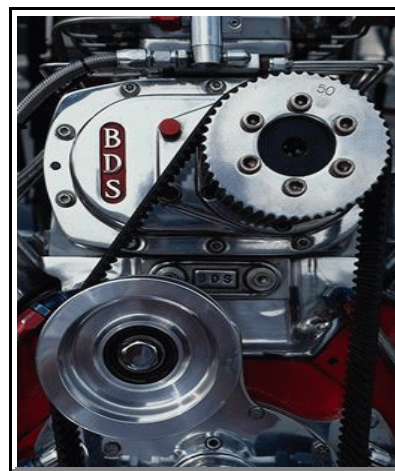
Table 5. (Standards, Design)

Standards and Benchmarks for Design

Standards	Benchmarks K-2	Benchmarks 3-5	Benchmarks 6-8	Benchmarks 9-12
The Attributes of Design	- Everyone can design - Design is a creative process	- Definitions of design - Requirements of design	- Design leads to useful products and systems - There is no perfect design - Requirements	- The design process - Design problems are usually not clear - Design needs to be refined -Requirements
Engineering Design	- Engineering design process - Expressing design ideas to others	- Engineering design process - Creativity and considering all ideas - Models	- Iteration - Brainstorming - Modeling, testing, evaluating, and modifying	- Design principals - Influence of personal characteristics - Prototypes - Factors in engineering design
The Role of Troubleshooting, Research and Development, Invention, and Innovation, and Experimentation in Problem Solving	- Asking questions and making observations - All products need to be maintained	- Troubleshooting - Invention and innovation - Experimentation	- Troubleshooting - Invention and innovation - Experimentation	- Research and development - Researching technological problems - Not all problems are technological or can be solved -Multidisciplinary approach

Content Standard – Abilities for a Technological World

Performance Objective:
Students will develop Abilities for a Technological World.

Rationale: Humans have historically been involved in technological activities. We use our knowledge, physical ability and technology to solve problems and seize opportunities. The design, development, and use of technological items are direct results of human resourcefulness. When a new technology is introduced and opportunities are acted upon, the technology begins to evolve bringing more opportunity and still more problems to solve.

Technological items and processes are inspired by a need, an end result, or just out of human curiosity. Students must be challenged to solve technological problems by drawing upon their knowledge to plan a solution, select the proper resources and processes, create, and then evaluate the solution.

Table 6. (Standards, Abilities for a Technological World)

Standards and Benchmarks for Human Ingenuity/Abilities for a Technological World				
Standards	**Benchmarks K-2**	**Benchmarks 3-5**	**Benchmarks 6-8**	**Benchmarks 9-12**
Apply Design Processes	- Solve problems through design - Build something - Investigate how things are made	- Collecting information – Visualize a solution - Test and evaluate solutions - Improve design	- Apply the design process - Identify criteria and constraints - Model a solution to a problem - Test and evaluate - Make a product or a system	- Identify a design problem - Identify criteria or constraints - Refine the design - Evaluate the design - Develop a product or system using quality control - Reevaluate final solution

Use and Maintain Technological Products and Systems	- Discover how things work - Use tools correctly and safely - Recognize and use everyday symbols	- Follow step-by-step instructions - Select and safely use tools - Use computers to access and organize information - Use common symbols	- Use information to see how things work - Safely use tools to diagnose, adjust and repair - Use computers and calculators - Operate systems	- Document and communicate processes and procedures - Diagnose a malfunctioning system - Troubleshoot and maintain systems - Operate and maintain systems - use computers to communicate
Assess the Impact of Products and Systems	- Collect information about everyday products - Determine the qualities of a product	- Use information to identify patterns - Assess the influence of technology - Examine trade-offs	- Design and use instruments to collect data - Use collected data to find trends - Identify trends - Interpret and evaluate accuracy of information	- Collect information and judge its quality - Synthesize data draw conclusions - Employ assessment techniques - Design forecasting techniques

Content Standard – The Designed World

Performance Objective:
Students will develop an understanding of The Designed World.

Rationale: The natural world consists of plants, and animals, earth, air, water and fire – resources that would exist without human intervention and invention. The social world includes customs, cultures, political systems, legal systems, economies, religions, and various other mores that humans have derived to govern their interactions and relationships with one another. The designed world consists of all modifications that humans have made to the natural world to satisfy their own needs and wants. The designed world is a product of a design process, which provides ways in which to turn energy and resources, tools and materials, machines and equipment, people and information, capital and time – into products and systems.
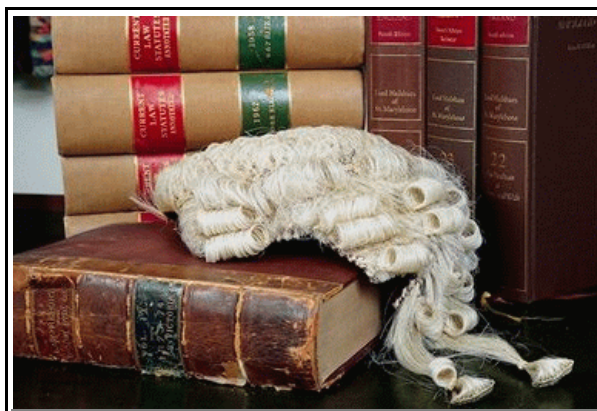

Table 7. (Standards, The Designed World)

Standards and Benchmarks for The Designed World

Standards	Benchmarks K-2	Benchmarks 3-5	Benchmarks 6-8	Benchmarks 9-12
Medical Technologies	- Vaccinations - Medicine - Products to care for people and their belongings	- Vaccines and medicine - development of devices to repair or replace certain parts of the body - Use of products or systems to inform	- Advances and innovations in medical technologies - Sanitation process - Immunology - Awareness of genetic engineering	- Medical technologies for prevention and rehabilitation - Telemedicine - Genetic therapeutics - Biochemistry

Agricultural and Related Biotechnologies	- Technologies in agriculture - Tools and materials for use in ecosystems	- Artificial ecosystems - Agricultural wastes - Processes in Agriculture	- Technological advances in agriculture - Specialized equipment and practices - biotechnology in agriculture - Artificial ecosystems and management - Development of refrigeration, freezing, dehydration, preservation, and irradiation.	- Agricultural products and systems - Biotechnology - Conservation - Engineering design and management of ecosystems
Energy and Power Technologies	- Energy comes in many forms - Energy should not be wasted	- Energy comes in many forms - Tools, machines, products, and systems use energy to do work	- Energy is the capacity to do work - Energy can be used to do work using many processes - Power is the rate at which energy is converted from one form to another - Power systems - Efficiency and conservation	- Law of conservation of energy - Energy sources - Second law of thermodynamics - Renewable and non-renewable forms of energy - Power systems are a source, a process and a load
Information and Communication	- Information - Communication - Symbols	- Processing information - Many sources - Communication - Symbols	- Information and communication systems - Communication systems encode, transmit, and receive information - Language of technology	- Parts of information and communication systems - Information and communication systems - The purpose of information and communication technology - Communication systems and subsystems - Many ways of communicating - Communication through symbols

Transportation Technologies	- Transportation systems - Individuals and goods - Care of transportation products and systems	- Transportation system use - Transportation systems and subsystems	- Design and operation of transportation systems - Subsystems of transportation system - Governmental regulation - Transportation processes	- Relationship of transportation and other technologies - Intermodalism - Transportation services and methods - Positive and negative impacts of transportation systems - Transportation processes and efficiency
Manufacturing Technologies	- Manufacturing designs - Design of product	- Natural materials - Manufacturing processes - Consumption of goods - Chemical technologies	- Manufacturing systems - Manufacturing goods - Manufacturing processes - Chemical technologies - Materials use - Marketing products	- Servicing and obsolescence - Materials - Durable and non-durable goods - Manufacturing systems - Interchangeability of parts - Chemical technologies - Marketing products
Construction Technologies	- Different types of buildings - How parts of buildings fit together	- Modern communities - Structures Systems used	- Construction designs - Foundations - Purpose of structures - Building systems and subsystems	- Infrastructure - Construction processes and procedures - Maintenance, alterations, and renovation - Prefabricated materials